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(54) Axial clamping cable gland

(57) A cable gland 10 consists of: a nut 20; a gland body 22; and located between the nut 20 and the gland body 22, a skid washer 30, an elastomeric compression seal 32, a first metallic washer 34, a second metallic washer 36 and an inner seal 38. The ends of electrically conductive strands 16 are located between the first and second metallic washers 34, 36. In use, when the compression nut 20 is screwed into the gland body 22, the elastomeric compression seal 32 is compressed and radially grips the outer sheath 14 of the cable 12. Simultaneously, the ends of the electrically conductive strands 16 are axially gripped between the first and second metallic washers 34, 36, thus ensuring electrical continuity. The cable gland 10 is easy to fit, provides electrical continuity and inner and outer sealing.

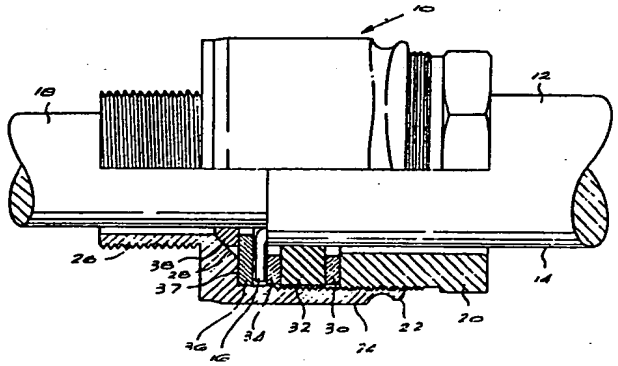
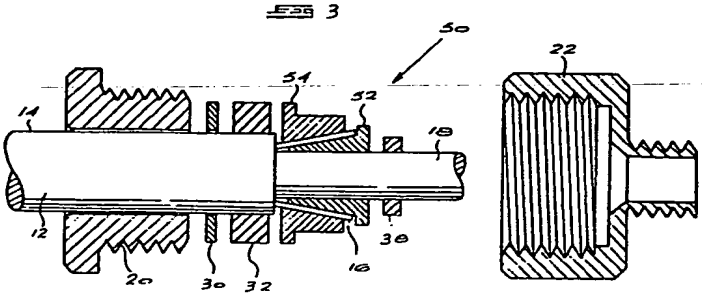


Fig 3



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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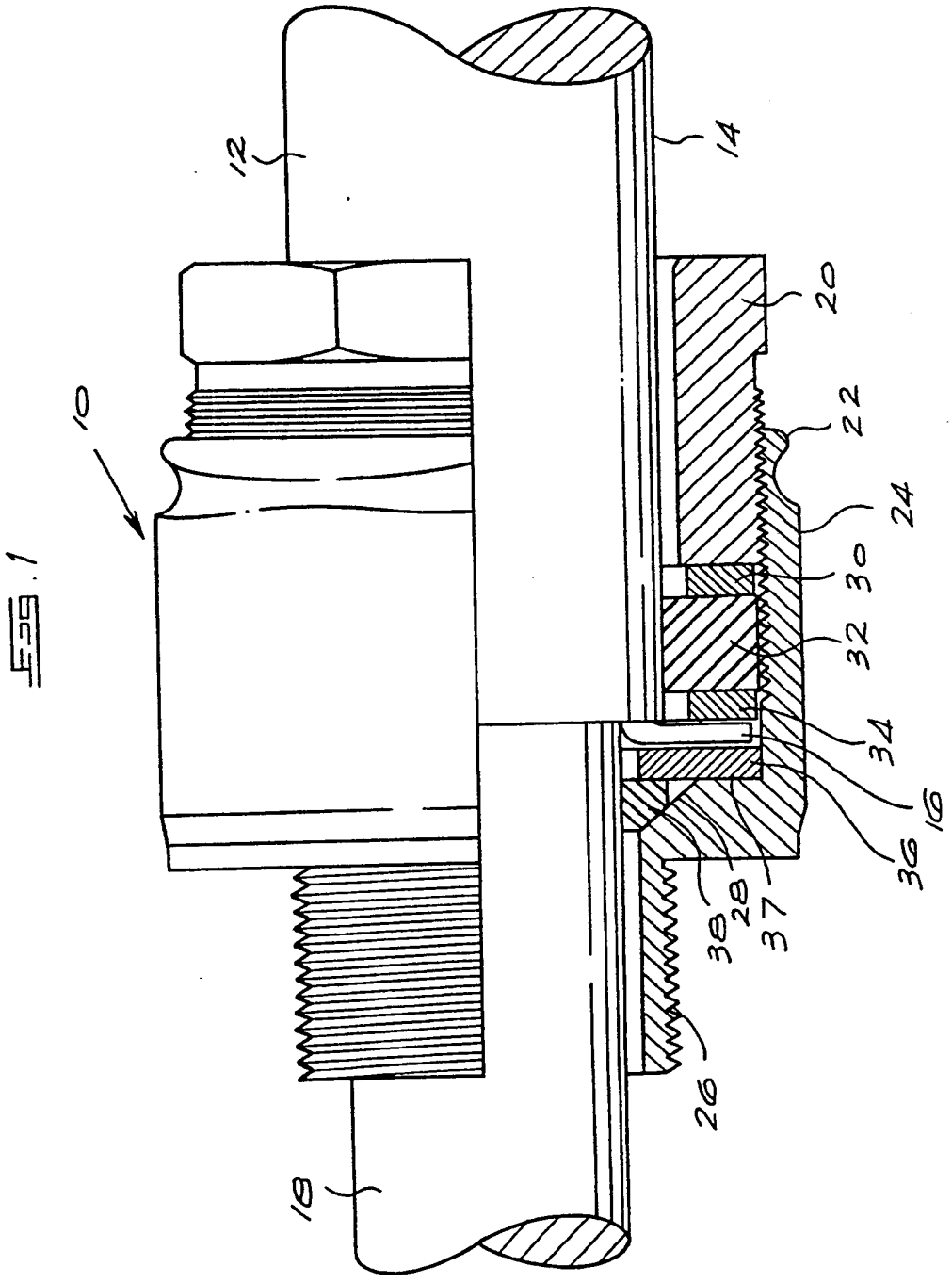

FIG. 1

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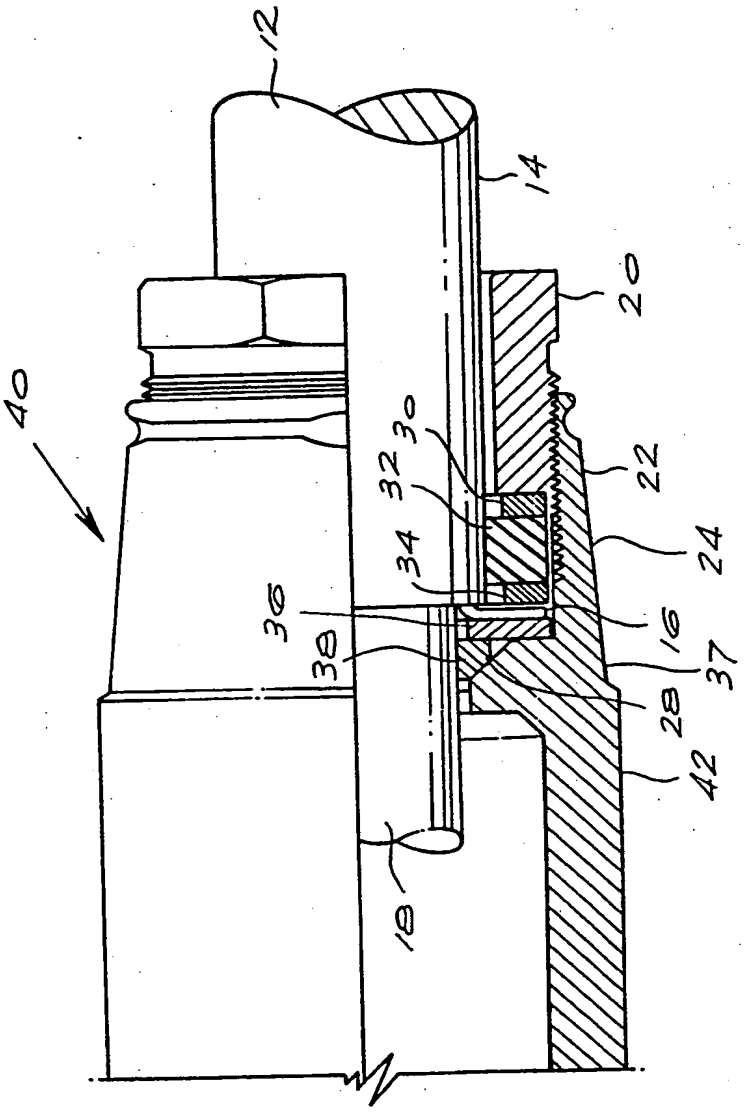

Fig 2

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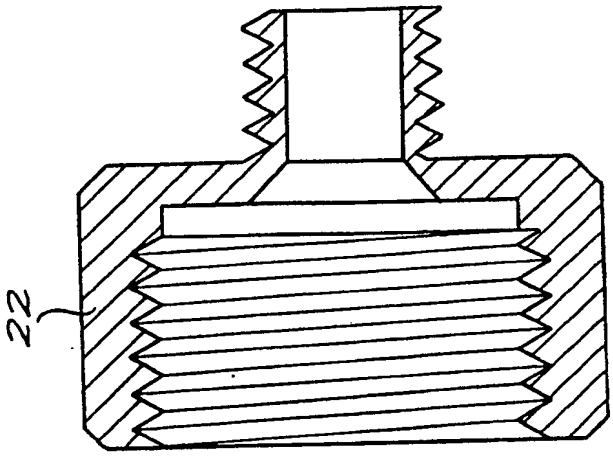

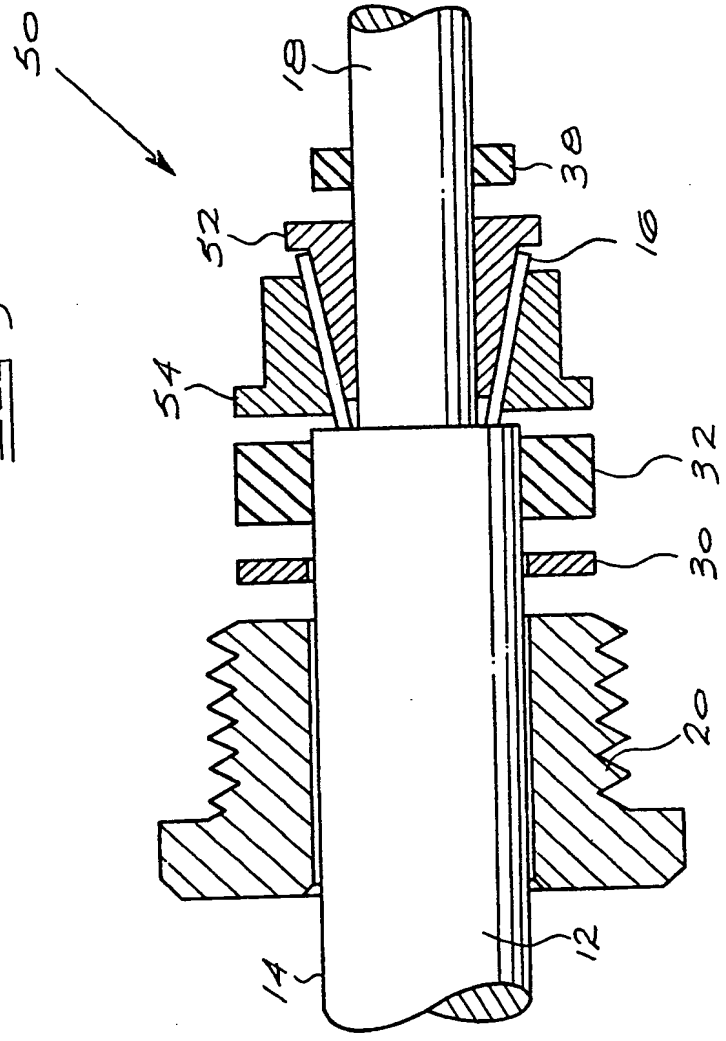

FIG 3

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Axial Clamping Cable Gland

This invention relates to a cable gland or clamp for mechanically attaching a screened, braided, wire armoured or the like cable to an apparatus.

Commonly, cable glands for use with screened, braided, wire armoured or the like cable comprise a gland body for attachment to the apparatus, the gland body being internally threaded, and a compression nut which is externally threaded and designed to co-operate with the gland body. There is located between the two clamping means such as a pair of annular co-operating tapers which are axially drawn together by thread action of the gland body and the compression nut and thereby clamp the braiding or armour wire between the tapers by wedge action.

Such a cable gland may include an elastomeric seal which seals around the cable bedding and thereby prevents the ingress of moisture into the apparatus. Such a seal is usually termed an inner seal. A further elastomeric seal may be provided at the rear of the cable gland. Such a seal compresses against the outer sheath of the cable and thereby seals against the ingress of moisture into the gland body where it may cause corrosion of the braiding or armour wire which is gripped in the gland clamping means. Such corrosion can adversely affect the electrical contact between the cable gland and the braid or armour wire. Typically, both the inner and outer seals are rubber bushes or rings which are compressed against the bedding or outer sheath respectively by means of the thread action of the cable gland components. In some instances however, an effective outer seal is achieved by the use of an elastomeric shroud which seals onto the outside of the cable gland and the outside of the cable.

Generally, the glands described above are relatively expensive and the preparation of the cable prior to fitting the cable gland is difficult as the braiding or armour wire has to be cut to a specified length and then neatly opened out in order to allow the male tapered component of the clamping means to slide underneath it.

An alternative method of glanding a braided or wire armoured cable is to use a conventional compression gland. Such glands do not provide electrical continuity with the braiding or armour wire but merely mechanically grip the cable. Typically this gripping action is provided by thread action which compresses an elastomeric bush onto the outside of the cable with a force which is sufficient to grip the cable effectively. Such a gland has the advantages of being easy to fit, of providing an automatic outer seal by virtue of its elastomeric bush and of being relatively inexpensive. Compression glands do however suffer the

disadvantage of not providing electrical continuity with the braiding or armour wire. Further, in the case of steel wire armoured cable, compression glands provide a cable gripping force which is substantially less than that which may be achieved by a conventional co-operating co-axial taper wedge type cable gland as previously described.

According to the invention there is provided a cable gland for attaching a cable to an apparatus, the cable comprising an outer sheath sheathing a plurality of electrically conductive strands surrounding an inner sheath sheathing at least one electrical conductor, comprising an externally threaded compression nut adapted to fit over the outer sheath of the cable, a gland body comprising a first internally threaded section adapted to co-operate with the externally threaded compression nut and a second section through which the inner sheath bared from the outer sheath and the electrically conductive strands is adapted to pass, and located between the compression nut and the gland body, a first annular element adjacent the compression nut, an annular elastomeric seal adjacent the first annular element and a second annular element adjacent the gland body, the elastomeric seal and the second annular element being adapted to grip between them the ends of the electrically conductive strands bared from the outer sheath, such that in use when the compression nut is screwed into the gland body, the elastomeric seal is compressed and grips the outer sheath and the elastomeric seal and the second annular element are urged together and grip the ends of the electrically conductive strands.

The cable may be a screened, braided or wire armoured cable or the like.

Preferably, a third annular element is located between the elastomeric seal and the ends of the electrically conductive

strands so that, in use, the ends of the electrically conductive strands are gripped between the second annular element and the third annular element.

Preferably, an inner elastomeric seal is located between the second annular element and the gland body intermediate the first section and the second section so that, in use, the inner elastomeric seal seals on to the inner sheath. The intermediate section of the gland body may be tapered to facilitate the gripping action of the inner elastomeric seal.

The second annular element and the third annular element may comprise metallic washers, i.e. flat rings.

Alternatively, the second annular element may have an exterior surface which tapers inwardly from the end of the second annular element adjacent the gland body and the third annular element may have an interior surface which has a complementary taper, so that, in use, the ends of the electrically conductive strands are gripped between the tapering surfaces of the second and third annular elements.

The first annular element is preferably an metallic skid washer.

The gland body may be integral with the apparatus. Alternatively, the gland body may be separate and may include means for attaching the gland body to the apparatus.

The cable gland may include an elastomeric shroud adapted to enclose the entire cable gland in use.

Figure 1 is a partially sectioned view of a first cable gland according to the invention;

Figure 2 is a partially sectioned view of a second cable gland according to the invention; and

Figure 3 is a partially sectioned view of a third cable gland according to the invention.

Referring to Figure 1, there is shown a cable gland 10 on a cable 12. The cable 12 consists of an outer sheath 14, a plurality of electrically conductive strands 16, running the length of the cable, e.g. braiding or armour wire, an inner sheath or bedding 18 enclosing one or more electrical conductors (not shown).

The cable gland 10 includes a compression nut 20 having an external male thread, and a gland body 22. The gland body 22 includes a first section 24 having an internal female thread designed to co-operate with the thread on the compression nut 20, a second externally threaded section 26 through which the inner sheath 18 passes in use, and an intermediate section 28 which is internally tapered. Located between the compression nut 20 and the gland body 22 is a metallic skid washer 30, an elastomeric compression bush or seal 32, a metallic washer 34, a metallic washer 36 and an inner annular seal 38.

The use of the cable gland 10 on the cable 12 will now be described. When it is desired to attach the cable 12 to an apparatus, a section of the outer sheath 14 is removed from the cable 12. Then, the electrically conductive strands 16 are cut so that a short sections only of these strands 16 protrude from the outer sheath 14. The ends of the electrically conductive strands 16 are then bent outwardly so that they are substantially at right angles to the longitudinal axis of the cable 12. The compression nut 20 is fitted on to the outer sheath of the cable 14, the skid washer 30 is located in position abutting the forward end of the compression nut 20, the elastomeric seal 32 is

located on the outer sheath 14 of the cable 12 abutting the skid washer 30, and the metallic washer 34 is located on the outer sheath 14 of the cable 12 abutting the elastomeric seal 32. From the other side, the inner seal 38 is located in the gland body 22, as is the washer 36 which abuts a shoulder 37 in the gland body 22. The ends of the electrically conductive strands 16 are thus located between the washer 34 and the washer 36. The compression nut 20 is then screwed in to the gland body 22 which firstly causes the elastomeric seal 32 to be compressed radially to grip the outer sheath 14 of the cable 12. Secondly, the washers 34, 36 are urged together axially to grip between them the ends of the electrically conductive strands 16. The skid washer 30 prevents twisting of the elastomeric seal 32 when the compression nut 20 is being rotated.

Electrical continuity is maintained between the electrically conductive strands 16 and the cable gland 10 via the washer 36 and the gland body 22.

The cable gland 10, when located on the cable 12, provides an outer seal via the elastomeric seal 32 to prevent the ingress of moisture into the cable gland 10 which may corrode the electrically conductive strands 16. Further, the cable gland 10 provides an inner seal via the inner seal 38, to prevent the ingress of moisture into the electrical apparatus to which the gland is attached. Further, the cable gland 10 provides electrical continuity between the electrically conductive strands 16, e.g. the cable braiding or armour wires or the like, the gland body 22 and thence the apparatus.

If desired, the cable gland 10 may be provided with an elastomeric waterproofing shroud attached to the cable 12 and completely covering the cable gland 10 to provide further sealing.

The cable gland 10 as illustrated has an externally threaded compression nut and an internally threaded gland body. As an alternative, a cable gland may be designed which has an internally threaded compression nut and an externally threaded gland body.

The cable gland 10 is designed with the gland body 22 as a separate element which includes an external thread for attaching the cable gland 10 to an apparatus. Referring to Figure 2, there is shown a cable gland 40 which is substantially the same as the cable gland 10 of Figure 1 except that the gland body 42 forms an integral part of the apparatus. Like parts of the cable and the cable gland of Figure 2 are referred to by the same reference numerals as in Figure 1.

Referring to Figure 3 there is shown a cable gland 50 which again is substantially the same as the cable gland 10 of Figure 1 except that the washers 34 and 36 of the cable gland 10 are replaced by annular conical or tapered rings 52 and 54. Again, like parts of the cable and cable gland of Figure 3 are given the same reference numerals as in Figure 1.

In the cable gland 50, the ends of the electrically conductive strands 16 are gripped between the external tapered surface of the ring 52 and the internally tapered surface of the ring 54.

The cable gland 50 is of particular application with wire armoured cable.

The cable gland of the invention has several advantages. Firstly, the means provided for clamping the braiding or wire armouring or the like need not require extensive preparation of the braiding or wire armouring, and thus may dispense with the difficulties associated with accurate preparation of the braiding or wire armouring. Secondly, the cable gland ensures electrical continuity between the cable braiding or wire armouring and the

apparatus. Thirdly, the cable gland is easy to fit and yet ensures outer and inner sealing.

CLAIMS

1.

A cable gland for attaching a cable to an apparatus, the cable comprising an outer sheath sheathing a plurality of electrically conductive strands surrounding an inner sheath sheathing at least one electrical conductor, comprises an externally threaded compression nut adapted to fit over the outer sheath of the cable, a gland body comprising a first internally threaded section adapted to co-operate with the externally threaded compression nut and a second section through which the inner sheath bared from the outer sheath and the electrically conductive strands is adapted to pass, and located between the compression nut and the gland body a first annular element adjacent the compression nut, an annular elastomeric seal adjacent the first annular element and a second annular element adjacent the gland body, the elastomeric seal and the second annular element being adapted to grip between them the ends of the electrically conductive strand bared from the outer sheath, such that in use when the compression nut is screwed into the gland body, the elastomeric seal is compressed and grips the outer sheath, and the elastomeric seal and the second annular element are urged together and grip the ends of the electrically conductive strands.

2.

A cable gland according to claim 1 wherein a third annular element is located between the elastomeric seal and the ends of the electrically conductive strands so that in use the ends of the electrically conductive strands are gripped between the second annular element and the third annular element.

3.

A cable gland according to claim 1 or claim 2 which includes an inner elastomeric seal located between the second annular element and the gland body intermediate the first section and the second

section so that in use the inner elastomeric seal seals on to the inner sheath.

4.
A cable gland according to claim 3 wherein the intermediate section of the gland body is internally tapered.

5.
A cable gland according to any one of claims 2 to 4 wherein the second and third annular elements comprise metallic washers.

6.
A cable gland according to any one of claims 2 to 4 wherein the second annular element has an exterior surface which tapers inwardly from the end adjacent the gland body and the third annular element has an interior surface which has a complementary taper, so that in use the ends of the electrically conductive strands are gripped between the tapering surfaces of the second annular element and the third annular element.

7.
A cable gland according to any one of claims 1 to 6 wherein the first annular element comprises a skid washer.

8.
A cable gland acccording to any one of claims 1 to 7 wherein the gland body is integral with the apparatus.

9.
A cable gland according to any one of claims 1 to 7 wherein the gland body includes means for attaching the gland body to the apparatus.

10.
A cable gland according to any one of claims 1 to 9 which includes an elastomeric shroud.

11.

A cable gland substantially as herein described with reference to any one of Figures 1 to 3 of the accompanying drawings.

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